Pest Alert

United States
Department of Agriculture

Forest Service

**Northeastern Area**
NA-PR-05-99

# Dutch Elm Disease (DED) and the American Elm

This row of elms was killed by DED, which moved through the root systems from one tree to the next.

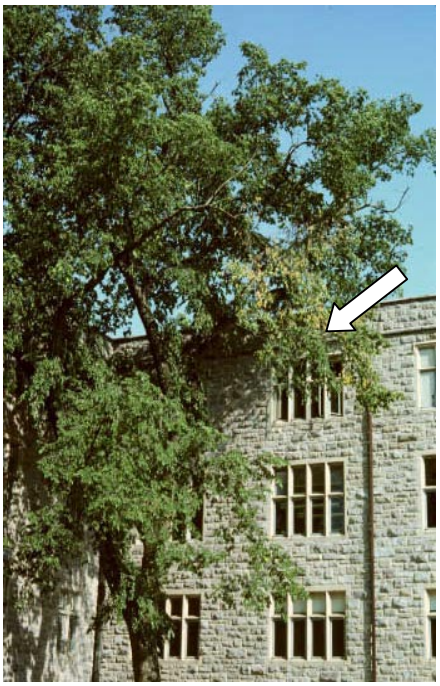
For decades the American elm was one of our most treasured trees, gracing streets and parks of many cities with beautiful form and dense foliage. The American elm was particularly well suited to urban sites because it grows quickly, is long-lived, and is tolerant of compacted soils and air pollution. However, in most communities Dutch elm disease (DED) killed a significant number of our American elms and threatens those that remain. By wisely choosing how we manage our urban elm resource, we can reduce the risk of remaining elms becoming diseased.

**What is DED, and where did it come from?**
DED is one of the most destructive shade tree diseases that affects elm trees. The disease kills individual branches and eventually the entire tree within one to several years. A fungus and an insect are responsible for DED development. The fungus was introduced to the United States on diseased logs from Europe in the 1930's.

**What causes the tree to die from DED?**
The DED fungus grows and reproduces in the water conducting parts of elm branches and stems. The fungus blocks water movement to tree leaves which causes the leaves to wilt and turn brown.

**How does the DED fungus get into the tree?**
The fungus needs help from insects, the elm bark beetles. Elm bark beetles use weakened and diseased trees to reproduce. Beetle offspring emerge from diseased elms and fly to healthy elms to feed. However, before leaving diseased trees, spores of the DED fungus (which are like tiny fungus "seeds") attach onto them. When these fungus-infested beetles feed on healthy tree branches, they make small wounds in the wood, and the fungus enters the branch directly through these wounds.

Once the fungus is in an elm tree, it can move through the root system of a diseased tree into the root system of adjacent healthy elm trees. It can do this because roots of elm trees growing close to each other frequently join or graft to each other.



Arrow points out minor DED symptoms (yellowing leaves on a single branch) in an American elm.

**How can I tell if an American elm has DED?**
Look for leaves that are wilting or yellow and which eventually turn brown. Wilting and leaf color change are symptoms of DED that occur during the spring and summer, but usually start to appear one month after trees leaf out in the spring. Leaves most affected appear at the end of large branches. Dead branches without leaves may indicate previous year's mortality from DED. In some communities, disease experts make routine elm examinations for DED symptoms.

**How and why do experts evaluate DED symptoms?**
Experts examine each tree and estimate the percent of leaves with symptoms and relate this percentage to where symptoms are located. This determines how much disease is in the tree, and it can also indicate whether the fungus infected the tree through joined roots or bark beetle wounds. The most appropriate DED management tactics are based on the amount of disease present. The amount of disease can be described simply as being either minor or major.

**What are minor amounts of DED in elms and can these elms be treated?**
Elms with minor DED have few symptoms (less than 10 percent of all leaves) usually located in only one large branch. DED may be eliminated from these trees by pruning out diseased branches and/or injecting chemical fungicide into the base of the trees. If left untreated, however, the amount of disease will increase.

**What are major amounts of DED in elms and can these elms be treated?**
Elms with major DED usually have more than 10 percent of all leaves or more than one large branch showing symptoms. Unfortunately trees with major amounts of disease cannot be effectively pruned. Fungicide injection is unlikely to be effective to stop an infection that has occurred through joined roots or which has affected a large portion of the branches. Elms with major amounts of disease will eventually die from the disease, and provide habitat for beetles and fungi that can infect healthy trees. Elms with major DED should be removed as soon as possible. This removal of diseased elms is called sanitation and is crucial to eliminate the spread of both the elm bark beetles and fungus to healthy neighboring elms.

**Is there hope for the American elm?**
Yes. If communities practice good sanitation (removal of dead trees), many existing elms will escape DED infection. It is also possible to prune diseased branches and inject individual high-value elms with fungicides to treat and protect them from DED infection. Also, scientists are now testing American elms that may be tolerant or resistant to DED. Combining all of these management tactics provides promise for the continued presence of American elms in our cities and parks.

**Where can I get more information about DED?**
The recent publication "How to Identify and Manage Dutch Elm Disease" is now available on the Internet at http://willow.ncfes.umn.edu/ht_ded/ht_ded.htm. Information is also available from your city forester, tree care companies, your local Cooperative Extension Service, or the Forest Service offices listed below.

Photographs provided by Dr. R. Jay Stipes, Virginia Polytechnic Institute and State University.

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July 1999